

Name: _____

Per: _____

Atomic Structure Lab: Imagining Isotopes

Introduction

At the stations set up around your classroom are several canisters. Each canister is labeled with a number, 1-20 and contains a model of an isotope of a newly discovered element named Sciencerocksium (Sk). These 20 “atoms” are representative of naturally occurring samples of Sciencerocksium. As you visit the stations, you will collect and record data in the data table. You will then use the data you collected to calculate the average atomic mass of Sciencerocksium.

Materials

Canisters (20)

Balance

Procedure

Part 1: Collecting the Data

1. At the first station you visit, open one of the canisters and pour out its contents (orange and blue cubes) onto the table. Measure the mass of the empty canister and record it in the empty space labeled “mass of empty canister.”
2. Count the orange cubes from the canister and record the number in the column labeled “Protons (orange cubes)” next to the canisters’ corresponding number.
3. Count the blue cubes from the canister and record the number in the column labeled “Neutrons (blue cubes)” next to the corresponding number.
4. Return all of the cubes to the canister and snap the cap onto the canister.
5. Measure the mass of the canister and record the mass in the space labeled “mass of canister + atom” next to the canisters’ corresponding number in the data table.
6. Repeat only step 5 for each of the canisters at your station. Do not open any other canisters other than the first one.
7. Move to another station and repeat only step 5 for all canisters at that station. Continue to move through the stations until you have data for all 20 canisters.

Part 2: Analyzing the Data

1. Calculate the mass of the atom for each canister by subtracting the Mass of the empty canister from the Mass of the canister + atom.

Remember, the atom consists only of the contents of the canister and not the canister itself. All of the canisters have the same mass, so you can use the Mass of the empty canister for all 20 atoms.

Record the mass of each atom in the column labeled Mass of the atom next to the canisters’ corresponding number.

Write the name of each isotope in the column labeled Name of isotope.

2. Answer the analysis and conclusion questions

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Data Table:

Mass of empty canister:					
Canister	Protons (orange cubes)	Neutrons (blue cubes)	Mass of Canister and Cubes	Mass of Atom (all cubes)	Name of Isotope
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Questions:

1. List the different isotopes of Sciencerocksium in the correct format (Example: Carbon-14).

A.

C.

B.

D.

2. Calculate the average atomic mass of Sciencerocksium following the steps listed below.

a. List the mass of each different isotope. Next to each mass, write the number of samples with that mass. Then multiply each mass by the number of samples next to it.

_____ X _____ = _____

_____ X _____ = _____

_____ X _____ = _____

_____ X _____ = _____

b. Find the sum of the products from the previous step. _____ + _____ + _____ + _____ = _____

c. Find the total number of samples. _____

d. Divide the sum by the total number of samples The average atomic mass of Sciencerocksium is

_____.